Food and Agriculture
Organization of the
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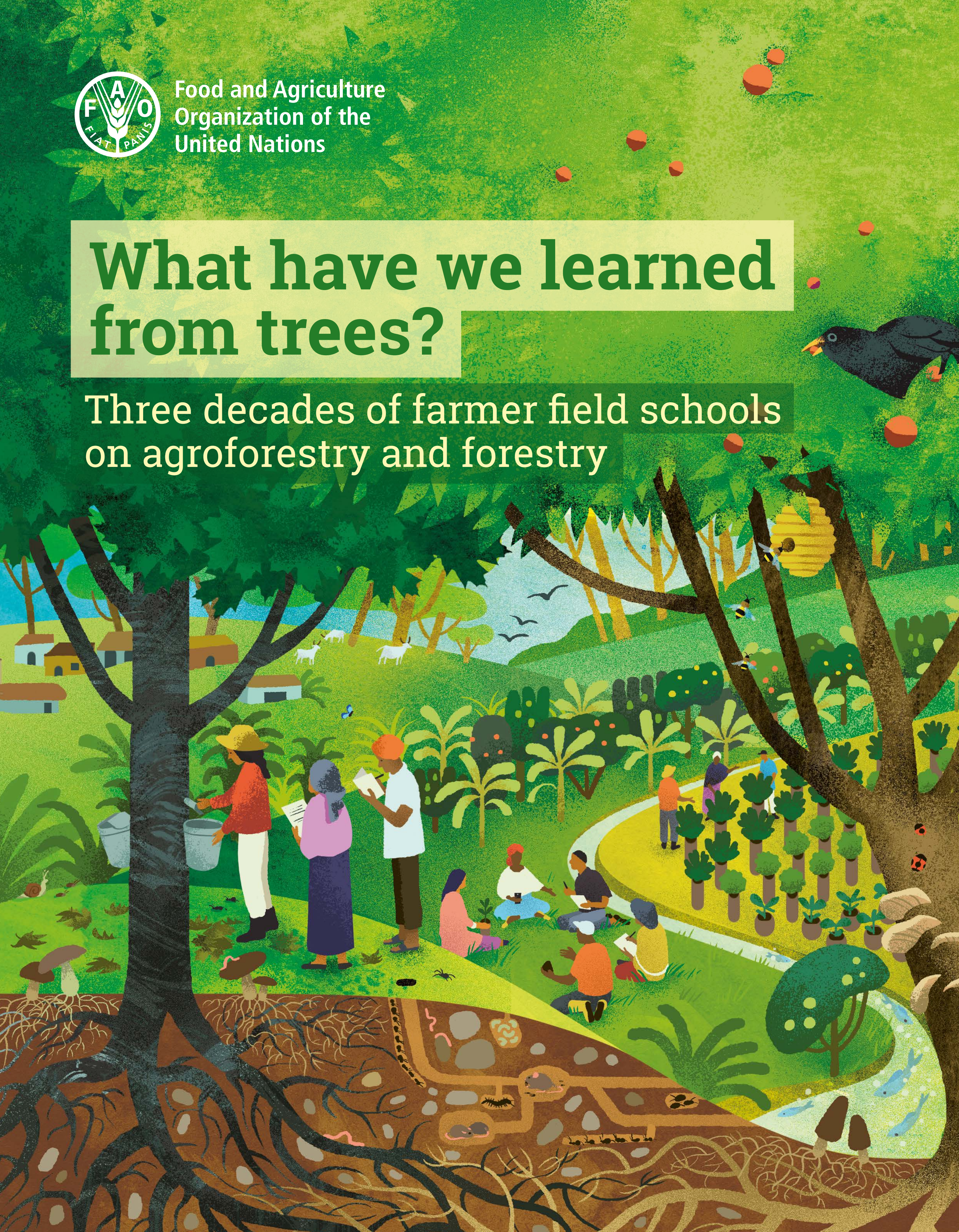
What have we learned from trees?

Three decades of farmer field schools on agroforestry and forestry



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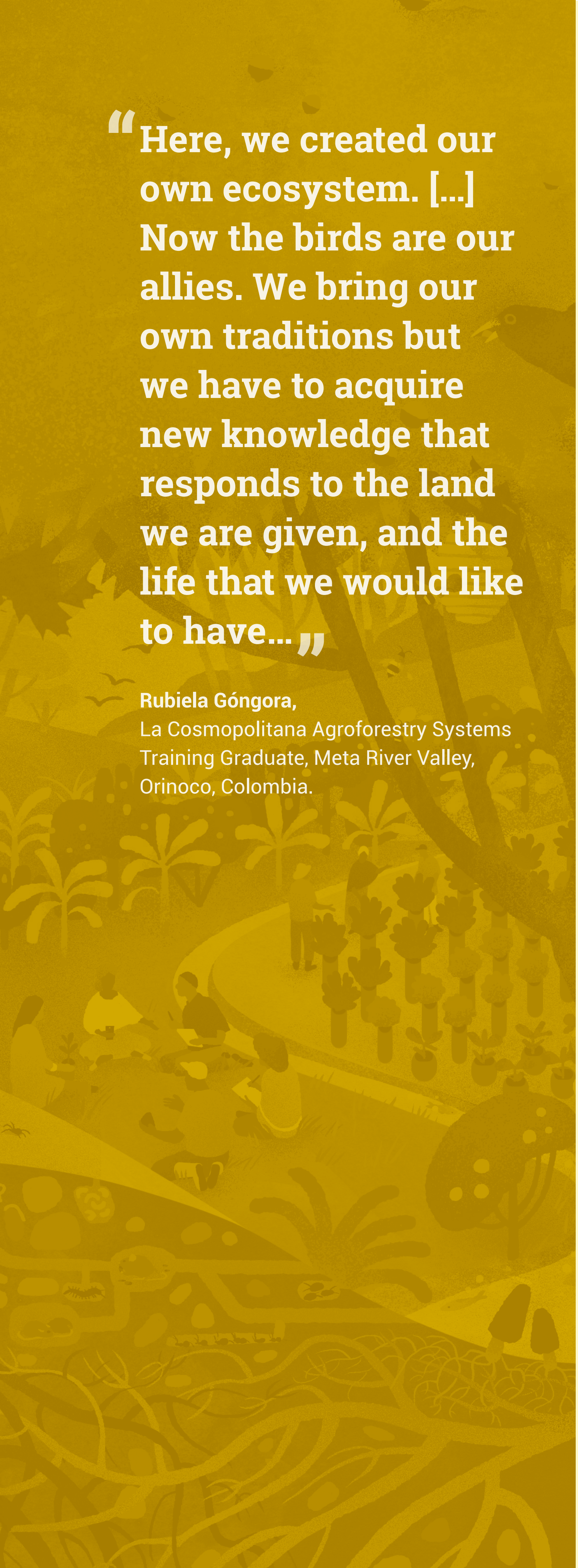

> “Here, we created our own ecosystem. [...] Now the birds are our allies. We bring our own traditions but we have to acquire new knowledge that responds to the land we are given, and the life that we would like to have...”

Rubiela Góngora,
La Cosmopolitana Agroforestry Systems Training Graduate, Meta River Valley, Orinoco, Colombia.

Key messages

The experiences of farmer field schools (FFS) around the world show a tremendous potential to advance small-scale forestry and agroforestry. By applying the FFS approach to agroforestry and forestry, it is possible to:

- Enable family farmers across the globe to develop the necessary knowledge, skills and social organization to achieve a more regenerative natural resource stewardship in and through small-scale and family farming, and to collectively contribute to sustainability and climate change targets.
- Support people-centred forest extension and community-based forestry by demonstrating the key role of better education and ecological literacy in empowering change in rural communities.
- Develop “response-ability”, i.e. the capacity of small-scale producers to respond to challenges in agriculture, food and natural resources management with renewed creativity, knowledge and technological development.
- Develop multiple ways of reducing the environmental impacts of agriculture while ensuring food security and nutrition and contributing to ecosystems restoration, climate change mitigation and adaptation, as well as biodiversity conservation.

Why farmer field schools on agroforestry and forestry?

Family farmers and smallholders produce a significant share of the world's food and are a major force in securing food supply and feeding the world's growing population. About 90 percent of the 608 million farms on the planet are family-run, of which 84 percent are smallholder farms of 2 ha or less. These farms operate only 12 percent of total agricultural land and yet produce about 35 percent of all food for human consumption (Lowder, Sánchez and Bertini, 2021). Not only do family and small-scale farming impact people's livelihoods, but they also directly influence ecosystems through their choice of agricultural practices and systems. As per the urgent appeals of the United Nations Decade of Family Farming, small-scale producers have an untapped potential to advance the Sustainable Development Goals (SDGs) and climate change mitigation and adaptation, and to become leading players in the restoration of ecosystems (FAO, 2014).

Drawing on vast, highly distributed and situated ecological knowledge across the planet, small-scale producers are capable of solving many issues related to food production and ecosystem restoration. Nevertheless, some of the challenges they face are complex and require deep knowledge and an advanced understanding of ecological and biological processes. Making agriculture and forestry more sustainable requires an investment in small-scale producers' knowledge and skills so that they can become major actors in local restoration and rural transformation.

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How to support family farmers and small-scale producers in navigating the challenges of today's agriculture and food production so that they become major actors in local restoration and rural transformation?

Over the last three decades, farmer field schools (FFS) have proven to be an effective discovery-learning-capacity building approach to help rural populations to innovate with more clarity and purpose while building the social skills needed for rural transformation and empowerment. With an initial focus on crop pest management, FFS expanded to broader, holistic agro-ecosystem management. Bringing together applied biology, experimentation and non-formal education, the FFS approach provides a platform for rural education and empowerment (see Box 1). FFS have addressed a wide range of topics on crops, livestock, aquaculture, soil, water and landscape management, integrated farming systems, business, climate change and more. Numerous programmes have also applied the FFS approach to different aspects of agroforestry (FAO, 2019).

Agroforestry refers to either simultaneous integration of perennial woody species in crop or animal production systems, or sequential alternation of annual crops and trees. Agroforestry is considered a key part of the solution to current challenges in sustainable agriculture and food production, climate change mitigation and adaptation, and ecosystem restoration. It provides several benefits in terms of **ecological, social and economic functions**. In ecosystems, trees are integral for restoring water cycles, reducing soil erosion and improving fertility, providing habitats for pollinators, increasing biodiversity, generating wood and leaf biomass, and capturing and storing carbon. They are an important **safety net for the vulnerable poor** because they provide food with high nutritional value and wood for cooking (firewood) and construction. Finally, they are also **a significant source of income for farmers**. By diversifying their cultivation practices, and planting and caring for trees on farms, family farms can become more resilient by targeting different markets and sources of income.

BOX 1. WHAT IS A FARMER FIELD SCHOOL GROUP?

In practice, a farmer field school (FFS) group comprises 20–30 farmers from the same locality. Supported by a trained facilitator, participants meet regularly throughout the entire growing season/ productive cycle. Participants learn how to improve their skills by observing, analysing and trying out new ideas on collective FFS study plots before applying them in their own farms. Building on their local knowledge systems, farmers are encouraged to solve problems through experimentation as well as to develop observation and monitoring skills. Facilitators play an essential role, particularly in training local producers to also become facilitators. In this way, farmers become motivated to return to their community with useful skills and knowledge to share.

Source: FAO. 2016. *Farmer field school guidance document: planning for quality programmes.* Rome.

What have we learned from FFS on agroforestry and forestry so far?

FAO's stocktaking study on forestry-related FFS (FAO, forthcoming) identified applications in over 20 countries involving over 200 000 producers across Africa, Asia and the Americas.[1] Major programmes addressed challenges in fields such as fruit tree production, woodlots, community forestry, soil and water management, and protected areas (see Figure 1).

The diverse forestry and agroforestry applications of the FFS approach had a high impact on fostering ecological literacy and unlocking creative capacities in problem-solving. As part of a self-directed and participatory learning and knowledge-building process, people were encouraged to take ownership of change occurring at the local level. While increasing their understanding of the direct impacts of climate mitigation and adaptation on their well-being, participants learned how trees and forest ecosystems can help them regenerate agricultural fields and landscapes. By strengthening the restorative power of rural people and communities, promised pathways are opened up for future action in farmer-led forest ecosystem management (see Box 2).

By creating a space in natural areas for in-depth and repeated learning encounters, FFS have helped food producers expand their knowledge in the interaction of agriculture and forest's ecological functions (see Box 2). These learning experiences allow them explore the landscapes' complexity and functioning, for example, with regard to photosynthesis, microbiology and carbon storage. FFS have also helped them utilize this experience to reflect on the ways to re-build these ecological functions in their agriculture systems as needed in order to transition agriculture and land from being a source of carbon emissions to a sink (see Boxes 2 and 4).

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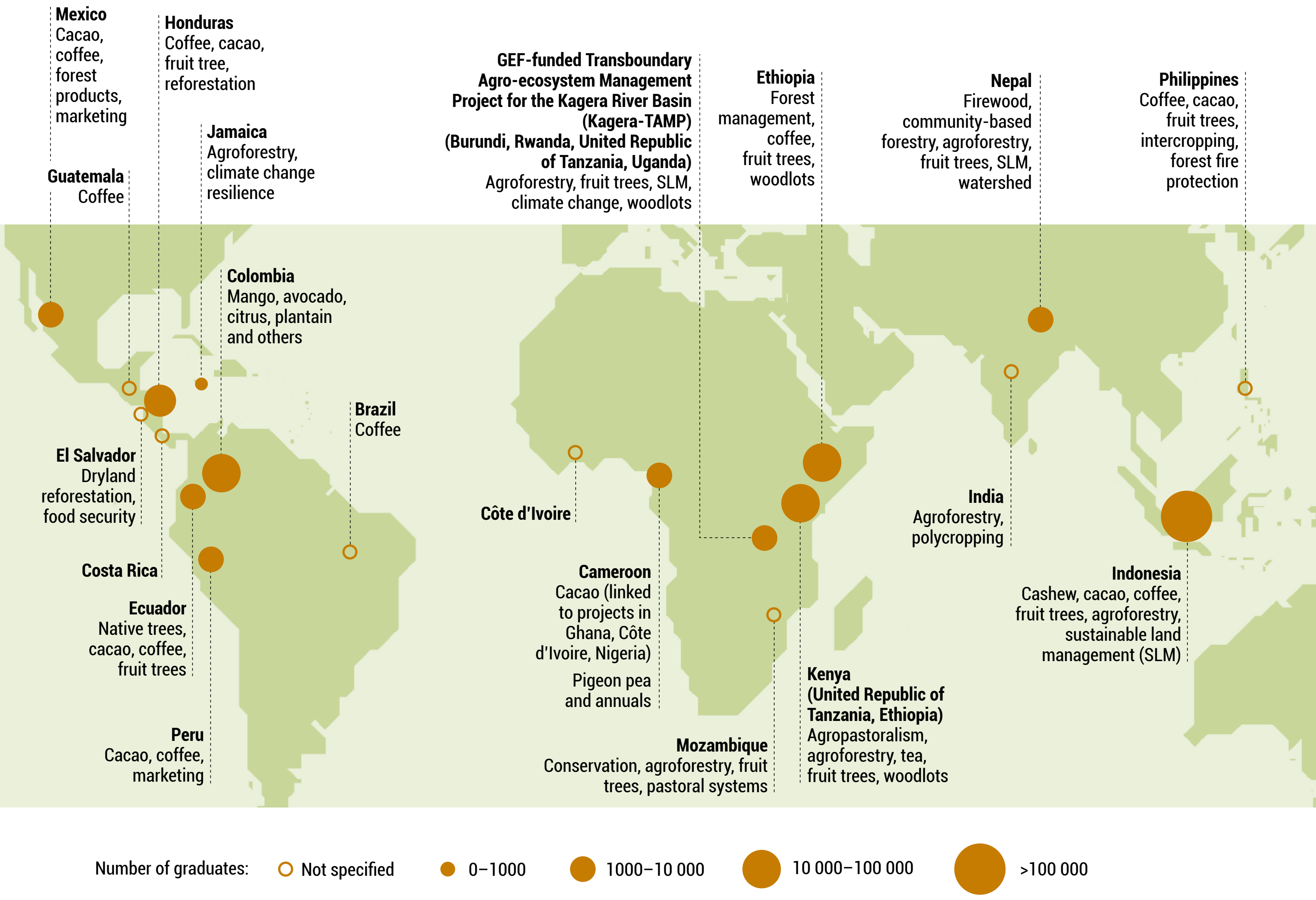
[1] Projects using FFS on forestry and agroforestry were identified in Costa Rica, Guatemala, Honduras, Nicaragua, Brazil, Colombia, Ecuador, Cameroon, Ghana, Côte d'Ivoire, Nigeria, Kenya, United Republic of Tanzania, Mozambique, India, Lao People's Democratic Republic, Indonesia and the Philippines.

FFS have also supported learners navigating interrelated production, processing, post-harvest management and marketing challenges (see Box 3). They have sought to fill knowledge gaps in the production of traditional, high-value foods while conducting experiments to test and develop best practices in achieving quality standards and production volumes.

FFS programmes have also been applied to strengthen public-private partnerships for the production of coffee, cacao, tea and other cash crops. For example, through FFS, rural families in the Ecuadorian Amazon have mobilized their knowledge of the *chakra* as a means of generating income without undermining biodiversity (FAO, forthcoming).

Figure 1. **FFS agroforestry- and forestry-related initiatives identified during the FAO stocktaking study**


Mexico Cacao, coffee, forest products, marketing
Honduras Coffee, cacao, fruit tree, reforestation
Jamaica Agroforestry, climate change resilience
Guatemala Coffee
GEF-funded Transboundary Agro-ecosystem Management Project for the Kagera River Basin (Kagera-TAMP) (Burundi, Rwanda, United Republic of Tanzania, Uganda) Agroforestry, fruit trees, SLM, climate change, woodlots
Ethiopia Forest management, coffee, fruit trees, woodlots
Nepal Firewood, community-based forestry, agroforestry, fruit trees, SLM, watershed
Philippines Coffee, cacao, fruit trees, intercropping, forest fire protection
Colombia Mango, avocado, citrus, plantain and others
Brazil Coffee
El Salvador Dryland reforestation, food security
Costa Rica
Ecuador Native trees, cacao, coffee, fruit trees
Peru Cacao, coffee, marketing
Côte d'Ivoire
Cameroon Cacao (linked to projects in Ghana, Côte d'Ivoire, Nigeria)
Pigeon pea and annuals
Mozambique Conservation, agroforestry, fruit trees, pastoral systems
Kenya (United Republic of Tanzania, Ethiopia) Agropastoralism, agroforestry, tea, fruit trees, woodlots
India Agroforestry, polycropping
Indonesia Cashew, cacao, coffee, fruit trees, agroforestry, sustainable land management (SLM)
Number of graduates:
○ Not specified
● 0–1000
● 1000–10 000
● 10 000–100 000
● >100 000

The boundaries and names shown and the designations used on these map(s) do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries. Dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Source: Based on FAO. (forthcoming). *Enabling "Response-ability": A stock-taking of farmer field schools in smallholder forestry and agroforestry.* Forestry working paper. Rome.

BOX 2. FARMER FIELD SCHOOLS FOR MANAGING FORESTS WITH COMMUNITIES IN INDONESIA

In 2001, Indonesia's state forestry corporation established a policy of *Pengelolaan Hutan Bersama Masyarakat* (PHBM, Community-based Forest Management), which provides communities living within or adjacent to state forest lands with clear access rights and management responsibilities. In turn, this creates the need for communities to be able to represent their interests and negotiate agreements with other forest stakeholders, be they from other communities, private enterprise or the state.

PHBM farmer field schools (FFS) were organized to help farmers build their individual and collective capacities in forest management. The planning/design group determined that it would be best to begin by focusing on upland agroforestry management, located within the broader context of integrated watershed management. The basic objective of these FFS on agroforestry was to provide families and communities living in the upland region with the knowledge and skills necessary to adopt conservation farming practices for their traditional agroforestry garden (known as a *kebun*) in order to conserve and protect water supplies (both surface and recharge). An obvious starting point was the farm family's need to reliably increase the income gained from the *kebun* by increasing the productivity of land and labour.

According to the implementers, ecologically sound agroforestry was more stable and profitable than conventional practices. Good soil management practice, including erosion control, the use of organic fertilizers and intercropping that combined medium- and long-term crop varieties with seasonal crops, enhanced the productivity and resilience of dryland agriculture systems.

PHBM that involved FFS were uniquely successful in advancing the agenda of integrated watershed management and biodiversity conservation. In five years, they helped set up 477 community groups, draft 44 management plans, plant nearly 5 million trees and rehabilitate 52 561 ha of land. PHBM identified the involvement of women as particularly strategic due to their deep knowledge of plants, cooking and family diets. Prior to the FFS, women provided much of the labour for the agroforestry system, but were not usually involved in its design and decision-making over management. As a result of their involvement in watershed protection, FFS actors made contacts with stakeholders at the lower watershed, which led to follow-up projects on topics like biogas production, cut-and-carry livestock feeding systems and coffee planting.

©FAO/Yunita Kopjanski, Indonesia

Source: FAO. (forthcoming). *Enabling "response-ability": A stock-taking of farmer field schools in smallholder forestry and agroforestry.* Forestry working paper. Rome.

BOX 3. LEARNING IN FARMER FIELD SCHOOLS ON AGROFORESTRY

Within farmer field school (FFS) programmes, draft curricula are developed through workshops with researchers, farmers, experts, master trainers and extension agents. The objective is to identify farmers' key needs and potential learning topics, and to design season- or year-long comparative studies that farmers will carry out and manage on their own during the learning season. Exercises and small experiments are also developed to facilitate the practical understanding of agro-ecosystem functions and production cycles, such as water and nutrient cycles, thus enhancing the efficiency of productivity. They also facilitate understanding on how to make business and marketing choices based on the availability of resources. Draft curricula are then adapted by facilitators to the specific needs, opportunities and characteristics of each local FFS group, based on a participatory diagnostic with the FFS group participants.

The learning process and curricula development can start with a series of questions to analyse and incorporate insights on forest ecosystems and production into FFS. Some of the questions could be:

- How is a forest ecosystem organized?
- What are pioneer, secondary and primary species? What do they have in common? How do they differ?
- What are the advantages of a layered polyculture?
- What is ecological succession?
- How can a successional polyculture system be designed?
- How can a successional polyculture plot be established?
- How can a successional agroforestry plot be managed?
- How can we generate added value to production?
- How can we engage equitably in agribusiness development and access to markets?

The methodological handbook and FFS training modules developed from the FFS programme in Colombia (FAO and the GEF, 2020) provide a good example of a FFS curriculum applied to landscape restoration and climate change adaptation. The learning topics include:

- cross-cutting approaches such as territorial and environmental governance, and intergenerational and ethical approaches;
- the socio-ecosystem connectivity approach and landscape management tools including mosaics of conservation and sustainable use;
- participatory land planning and social mapping;
- risk and management of climate variability adaption including disaster, resilience, climate change and diverse agro-ecosystems;
- agroecology, crop production and seed preservation;
- sustainable production systems, in particular agroforestry systems, mixed sustainable orchards, community forest and marine restoration, beekeeping, and sustainable and responsible fishing;
- crop harvest and post-harvest activities; and
- transformation, label of origin, commercialization and participatory guarantee systems.

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BOX 4. INTENSIFYING SOCIAL FORESTRY IN SEMI-ARID AREAS OF EAST AFRICA

The Intensified Social Forestry Project in Semi-arid Areas in Kenya is one of the longest-standing farmer field school (FFS) applications in forestry. Established in 2004, this work led by the Kenyan Forestry Department, the Kenyan Forestry Research Institute, and the Japanese International Cooperation Agency (JICA) aimed to develop and intensify farm forestry in dry areas. In part, this strategy has sought to offset pressures on state-protected forests located in medium and high rainfall areas. In particular, the project has sought to help farmers manage the numerous woodlands, bushlands and wooded grasslands in arid and semi-arid areas. Later this work was extended to the United Republic of Tanzania and Ethiopia.

In this project, 'social forestry' is understood as the practice of forestry outside of protected areas that includes farm forestry, community forestry and urban forestry, but is mostly focused on rural farm application. The following activities were explored through FFS:

- seedling production by farmers and farmer groups;
- tree planting within the farmlands in configurations, such as woodlots, boundary planting, homestead planting, windbreaks, isolated trees within farms or pasturelands, and trees planted in degraded areas for rehabilitation;
- production of non-wood forest products; and
- soil fertility management using tree biomass.

Through the application of FFS in social forestry, the partners worked to enable 8 250 farmers (70 percent women) organized in 330 FFS groups and their communities to increase the stock of trees in private farms and in communal pasturelands as a means of reducing the deficit of wood and easing the pressure on protected areas.

©FAO/Deborah Duveskog, Kenya

Source: FAO. (forthcoming). *Enabling "Response-ability": A stock-taking of farmer field schools in smallholder forestry and agroforestry.* Forestry working paper. Rome.

Key recommendations to tap the potential of farmer field schools on agroforestry and forestry

1. Create alliances and partnerships among stakeholders and initiatives that share a common commitment to forestry, regenerative agriculture and ecological restoration. Alliances and partnerships are needed at the global to the local level. They can be stimulated by joint programmes, co-creation of knowledge, community of practices, monitoring, etc.

2. Invest in forest extension programmes that use people-centred approaches and aim to co-produce knowledge and develop soft skills. Support transitions of extension and forest services from top-down, one-way advice to participatory approaches, facilitating rural platforms that co-produce solutions and in which producers contribute to knowledge generation and advisory services together with forest and agricultural services.

3. Incorporate ecological knowledge in forest education and extension programs as a basis for productive and healthy ecosystems. Focus on ecological performance to help participants identify fundamental biological principles that can sustain sustainable production and consumption, and foster creativity and innovation.

4. Support training and extension programmes that include practical exploration by small-scale producers of concepts and designs of various forms of agroforestry, permaculture, food forests through FFS curricula development and field implementation. Focus the programmes of FFS on polycultures integrating agriculture, trees and insights from forest ecosystems. Polycultures are vehicles for greater food security, regenerative land management and climate change mitigation and adaptation.

5. Systematically include women as participants and new leaders in forestry learning and innovation. Involving women and girls in forestry and FFS-related activities is particularly strategic due to their knowledge of plants, cooking, family diets and health. Women and girls play an important role in the forest sector, not only in livelihood activities at the community level, managing and conserving forests, but also in productive and income-generating initiatives such as agroforestry production.

6. Promote policy and market incentives and schemes that support farmers to diversify their production and create market opportunities for sustainable products. The incentives should focus on: (i) transforming and increasing the profile of perennials as long-term opportunities for stable food and fibre production and essential ecosystem functions on farms; and (ii) supporting the provision of ecosystem services.

7. Integrate local business and income-generating activities into FFS and community initiatives. Generating financial returns can help inspire and sustain increasing investment in farmer-led rehabilitative and restorative activities. Developing opportunities for marginalized segments of the population, such as women, youth, children and landless people, is key to counter the continual emigration of youth to urban centres and brain and labour drain.

8. Invest in locally successful practices and innovators to facilitate innovative and inclusive solutions grounded in local systems. Identify outstanding FFS graduates and forestry and agroforestry practitioners for further training and invest in their proposals to strengthen leadership and organizational capacities, feeding into farmer-to-farmer knowledge transfer and innovation.

9. Create frameworks and incentives that establish continued collaboration between scientists and farmers practising regenerative agriculture and permaculture, and apply traditional ecological knowledge. Include technical staff as potential beneficiaries of FFS learning on cutting-edge regenerative plantation and forestry management.

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1 NO POVERTY
2 ZERO HUNGER
4 QUALITY EDUCATION
13 CLIMATE ACTION
15 LIFE ON LAND

FFS develop the skills and knowledge of producers, allowing them to create more efficient and sustainable production systems, and contribute to the achievement of the Sustainable Development Goals (SDGs).

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